

AMENDMENT TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Please amend the claims as follows:

1. (Currently amended) A film-forming method of forming a titanium nitride film on a substrate to be processed through reaction of titanium tetrachloride and ammonia, said method comprising:

a first step of reacting titanium tetrachloride and ammonia with each other in a supply-limited region, thereby forming a first titanium nitride layer on the substrate; [[and]]

a second step of annealing the substrate using N₂ gas or H₂ gas;

a ~~second~~ third step of reacting titanium tetrachloride and ammonia with each other in a reaction-limited region, thereby forming a second titanium nitride layer on the first titanium nitride layer; and

a fourth step of annealing the substrate using N₂ gas or H₂ gas,

wherein partial pressure ratio of the titanium tetrachloride to ammonia in the first step is lower than that in the third step, and

wherein temperature of the substrate in the first step is lower than that in the third step.

2. (Cancelled)

3. (Currently amended) The film-forming method according to claim 1, wherein the partial pressure ratio of the titanium tetrachloride to the ammonia in the first step is not less than 0.13 but less than 0.2, and the partial pressure ratio of the titanium tetrachloride to the ammonia in the ~~second~~ third step is not less than 0.2 but less than 1.5.

4. (Cancelled)

5. (Currently amended) The film-forming method according to claim 3, wherein the temperature of the substrate in the first step is not lower than 200°C but lower than 400°C, and the temperature of the substrate in the ~~second~~ third step is not lower than 400°C but lower than 700°C.

6. (Currently Amended) A film-forming method of forming a titanium nitride film on a substrate to be processed in a chamber through reaction of titanium tetrachloride and ammonia, said method comprising:

a first step of supplying titanium tetrachloride and ammonia into the chamber with flow rate ratio of the ammonia to the titanium tetrachloride ($\text{NH}_3/\text{TiCl}_4$ flow rate ratio) being a first flow rate ratio, while pressure in the chamber being maintained within a range of 39 to 1333 Pa, thereby forming a first titanium nitride layer on the substrate;

a second step of annealing the substrate using N_2 gas or H_2 gas;

a ~~second~~ third step of supplying titanium tetrachloride and ammonia into the chamber with flow rate ratio of the ammonia to the titanium tetrachloride ($\text{NH}_3/\text{TiCl}_4$ flow rate ratio) being a second flow rate ratio smaller than the first flow rate ratio, while pressure in the chamber being maintained within a range of 39 to 1333 Pa, thereby forming a second titanium nitride layer on the first titanium nitride layer; and

a fourth step of annealing the substrate using N_2 gas or H_2 gas,

wherein temperature of the substrate in the first step is lower than that in the third step.

7. (Previously presented) The film-forming method according to claim 6, wherein the first flow rate ratio is not less than 2.5 but not more than 60, and the second flow rate ratio is not less than 0.3 but not more than 10.

8. (Previously presented) The film-forming method according to claim 7, wherein the first flow rate ratio is not less than 2.5 but not more than 15.

9 - 10. (Cancelled).

11. (Currently amended) The film-forming method according to claim 1 or 6, wherein the first and second titanium nitride layers are formed while the substrate is placed in the chamber in the first and third ~~second~~ steps,

said method further comprising a step of purging an interior of the chamber with a purge gas after at least one of the first and third ~~second~~ steps.

12. (Original) The film-forming method according to claim 11, wherein the purge gas comprises at least one of nitrogen gas, hydrogen gas and argon gas.

13-14. (Cancelled)

15. (Withdrawn) A semiconductor device including the titanium nitride film formed by the film-forming method according to claim 1 or 6.

16. (Withdrawn) A storage medium storing a software executable by a control computer of a film-forming apparatus, wherein upon execution of the software the control computer controls the film-forming apparatus so that the apparatus performs a film-forming method of forming a titanium nitride film, said method comprising:

a first step of reacting titanium tetrachloride and ammonia with each other in supply-limited region, thereby forming a first titanium nitride layer on the substrate; and

a second step of reacting titanium tetrachloride and ammonia with each other in reaction-limited region, thereby forming a second titanium nitride layer on the first titanium nitride layer.

17. Cancelled

18. (Withdrawn) A film-forming system for forming a titanium nitride film on a substrate through reaction of titanium tetrachloride and ammonia, said system comprising:

at least one film-forming apparatus including: a film-forming chamber; a substrate support member that supports a substrate in the film-forming chamber; a first supply line,

provided thereon with a first gas flow controller, that supplies titanium tetrachloride into the film-forming chamber; a second supply line, provided thereon with a second gas flow controller, that supplies titanium ammonia into the film-forming chamber; and an exhaust device that evacuates an atmosphere in the film-forming chamber; and

a control unit that controls said at least one of the film-forming apparatus so that the apparatus performs a first step of reacting titanium tetrachloride and ammonia with each other in supply-limited region, thereby forming a first titanium nitride layer on the substrate, and a second step of reacting titanium tetrachloride and ammonia with each other in reaction-limited region, thereby forming a second titanium nitride layer on the first titanium nitride layer.

19-24. (Cancelled)